

## Trigonometric Identities

Extra Credit Project

Due NO LATER THAN \_\_\_\_\_

**Your Task:** Create a set of Trig Identities Manipulatives and use them to prove a trig identity to the class.

- You may work independently or with one other person on this project.
- This project is worth a quiz grade.
- You must be prepared to present your project in class on the day you turn it in.

**Background:** View the two videos at the following links:

<http://www.youtube.com/watch?v=qkwbZP00MpY>

<http://www.youtube.com/watch?v=N5wBkiAqV5U&feature=related>

These videos show what the manipulatives look like and how to present a solving trig identity to the class.

**Materials needed:**

- construction paper in red, yellow, blue, purple, green, orange, white
- Trig Identities formula sheet
- Scissors
- Ziploc bag to hold manipulatives
- Rubric for Project

### Rubric for Project

Criteria:	Points Possible:	Points earned:
Manipulatives are well constructed, complete, and have accurate information	20	
Trig identity is solved correctly	20	
Reflection questions are typed neatly, thoughtfully answered and have clear, complete sentences.	20	
The class presentation is clear, accurate and easy to understand	30	
The project is completed on time with rubric turned in	10	
Consultation Fees*:	5 points per question	
Total:	100	

Your set of manipulatives must contain the following cards. The cards must be large enough so they can easily be seen and moved around on the white board. Be sure to include the information that goes on the back of each card (see videos for details).

Front of card	Color	Shape	quantity
$\cos\theta$	Red	Indent on top, jagged on bottom	4
$\sin\theta$	Yellow	Jagged on top, point on bottom	4
$\cos^2\theta$	Red	Two indents on top, jagged on bottom	2
$\sin^2\theta$	Yellow	Jagged on top, two points on bottom	2
$\tan\theta$	Orange	Jagged on top and bottom	4
$\tan^2\theta$	Orange	Jagged on top and bottom	2
$\sec\theta$	Purple	Jagged on top and bottom	4
$\csc\theta$	Green	Point on top and bottom	4
$\cot\theta$	Orange	Indent on top, point on bottom	4
$\sec^2\theta$	Purple	Jagged on top and bottom	2
$\csc^2\theta$	Green	Two points on top and bottom	2
$\cot^2\theta$	Orange	Two indents on top, two points on bottom	2
1	Blue	Point on top, jagged on bottom	4
- (minus sign)	White	rectangle	3
+ (plus sign)	White	Rectangle	3
=	White	rectangle	2

**Reflection Questions:**

Answer the following questions and turn in with your rubric:

1. Explain how  $\tan \theta$ ,  $\cot \theta$ ,  $\csc \theta$ , and  $\sec \theta$  got their colors and shapes.
2. Explain how  $\sin^2 \theta$  and  $\cos^2 \theta$  got their shapes.
3. How might you change the manipulative to make it easier to understand the trig identities?
4. Does working with these manipulatives help you understand trig identities better? Why or why not?

Trig Identities to Choose From (Check with me first before picking your identities – no duplicates allowed!)

$$\tan \theta \cos \theta + \cot \theta \sin \theta = \sin \theta + \cos \theta$$

$$\frac{\cos \theta}{\cot \theta} + \frac{\sin \theta}{\tan \theta} = \sin \theta + \cos \theta$$

$$\sec^2 \theta - 1 = \frac{\sin^2 \theta}{1 - \sin^2 \theta}$$

$$\sin \theta (\cot \theta + \tan \theta) = \sec \theta$$

$$\frac{\cos^2 \theta}{1 - \sin \theta} = \frac{\cos \theta}{\sec \theta - \tan \theta}$$

$$(\tan \theta + \cot \theta)^2 = \csc^2 \theta \sec^2 \theta$$

$$\frac{1 + \sec \theta}{\sec \theta} = \frac{\sin^2 \theta}{1 - \cos \theta}$$

$$\frac{\sin \theta}{1 - \cos \theta} = \csc \theta + \cot \theta$$

$$\sec \theta - \tan \theta = \frac{1 - \sin \theta}{\cos \theta}$$

$$\sec \theta \csc \theta = \tan \theta + \cot \theta$$

$$(\sin \theta + \cos \theta)^2 = \frac{2 + \sec \theta \csc \theta}{\sec \theta \csc \theta}$$

$$\csc \theta - 1 = \frac{\cot^2 \theta}{\csc \theta + 1}$$

$$\sin \theta \cos \theta \tan \theta + \cos^2 \theta = 1$$

$$\csc^2 \theta = \cot^2 \theta + \sin \theta \csc \theta$$

$$\sin^2 \theta + \cos^2 \theta = \sec^2 \theta - \tan^2 \theta$$